



## Lamitex® HDE Sheet

Lamitex® HDE Paper Phenolic Laminate sheet. HDE (High DiElectric) is a NEMA XX high voltage insulating paper phenolic laminate. It is frequently used in high voltage transformers and tap changers because of its good breakdown voltage in air and moderate relative humidity. HDE conforms to the requirements of DIN 7735-HP 2061.5.

**Standards:** EN 60893 PF CP 202  
DIN 7735 HP 2061.5

**Availability:** HDE is also manufactured as fabricated custom parts.

Physical Properties	Test Method EN 60893-2	Standard	Test Specimen	Conditioning IEC 212	Typical Values
Flexural Strength	5.1	ISO 178	≥1.6 mm thick	1	21,756 psi
Flexural Strength at Elevated Temperatures	5.1	ISO 178	≥1.6 mm thick	--	--
Modulus of Elasticity	5.2	ISO 178	≥1.6 mm thick	1	1.16 x 10 <sup>6</sup> psi
Compressive Strength	5.3	ISO 604	≥5.0 mm thick	1	43,512 psi
Izod Impact Strength Parallel	5.5.3	ISO 180/2A	≥5.0 mm thick	1	1.66 ft.lb-force/in <sup>2</sup>
Shearing Strength Parallel	5.6	EN 60893-2	≥5.0 mm thick	1	5,076 psi
Tensile Strength	5.7	ISO 527	≥1.6 mm thick	1	15,954 psi

### Electrical Properties

Electric Strength in oil @ 90°C	Perpendicular to Laminations	6.1.2	IEC 243-1	3.0 mm thick	2	338 Vpm
	Parallel to Laminations	6.1.3	IEC 243-1	> 3.0 mm thick	2	61 Vpm
Permittivity:	50Hz	6.2	IEC 250	≤3.0 mm thick	3	5.0
	1MHz			≤3.0 mm thick		--
Dissipation Factor:	50Hz	6.3	IEC 250	≤3.0 mm thick	3	0.03
	1MHz			≤3.0 mm thick		--
Insulation Resistance after Immersion in Water	1MHz	6.2	IEC 167	All	4	100 MΩ
Comparative Tracking Index (CTI)		6.4	IEC 112	≥3.0 mm thick	1	100 V
<b>Electrical Properties</b>						
Temperature (Thermal Endurance) Index @ 20,000 hours		7.1	IEC 216	≥3.0 mm thick	-	120°C (248°F)
Flammability			IEC 707	5.0 mm thick	-	--
Density		8.1	IEC 1183-A	All	1	1.35 g/cm <sup>3</sup>
Water Absorption		8.2	IEC 62-1	50x50x3 mm	4	1.19 % by wgt.

Conditioning:

- 1: 24h @ 23°C & 50%RH
- 2: 24h @ 23°C & 50%RH + 1hr in oil at 90°C
- 3: 96h @ 105°C + 1hr @ 23°C & 20%RH
- 4: 24h @ 50°C + 24hr in water at 23°C
- 5: 96h @ 105°C + 1hr in oil at 90°C

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